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# Exercise adherence and effects in obesity



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**Abstract**

Aim: Examining the effects of exercise adherence in individuals with obesity may offer insights for developing new approaches. The aim of this study was to evaluate exercise adherence rates, associated factors, and the effects of exercise on obesity.

Material and Methods: Individuals admitted to the Multidisciplinary Obesity Unit were included in the study. Participants underwent a 12-week group program. At the beginning and end of the program, the International Physical Activity Questionnaire-Short Form (IPAQ-SF) and the Impact of Weight on Quality of Life Questionnaire (IWOQ-Lite) were administered, and adherence to the exercise program was recorded.

Results: The changes in IPAQ-SF and IWOQ-Lite is statistically significant ($p<0.05$). A negative correlation was found between age and change in the IWOQ-Lite ($r=-0.330$, $p=0.002$), while a positive correlation was identified between exercise compliance and change in the IWOQ-Lite ($r=0.545$, $p<0.001$). No correlation was found between Body Mass Index (BMI), obesity severity, and changes in the IWOQ-Lite ($r=-0.144$, $p=0.251$; $r=-0.087$, $p=0.491$, respectively). None of the parameters such as age, gender, BMI marital status, active employment status, BMI, obesity severity and comorbidities were identified as independent risk factors for exercise adherence ($p>0.05$).

Discussion: Exercise adherence is low among individuals with obesity. Physical activity levels and quality of life can be improved by adhering to a multidisciplinary program.

**Keywords**

Compliance, Exercise, Obesity, Physical Activity, Quality of Life

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## Introduction

Obesity prevalence is increasing alarmingly worldwide. Obesity, which is known to cause numerous medical complications, increase morbidity, mortality, and reduce both quality of life (QoL), and life expectancy, has been reported to affect 18.8%-36% of the population in Turkey [1, 2].

In recent years, the term "multidisciplinary approach" has become very popular in the field of health, multidisciplinary evaluation and follow-up practices in chronic diseases and obesity have become widespread and studies on their effects have been put forward [3, 4]. A multidisciplinary team consists of healthcare professionals from different specialties and health and care personnel. Teams consisting of general surgeons, endocrinologists specialized in pharmacotherapy, nurses, dietitians, physiatrists, physiotherapists, psychiatrists, and psychologists play an active role in the fight against obesity by using the most effective interventions from each discipline [5].

Physical activity (PA), defined as "any skeletal muscle or body movement that causes energy expenditure", plays a crucial role among non-surgical methods such as dietary counseling, behavioral support, and medical treatment in the treatment of obesity. PA levels vary among individuals depending on many internal and external factors and personal preferences [6, 7]. Evaluation of PA in people with obesity is important for the production of effective intervention programs [8]. The relationship between PA level and QoL in people with obesity was examined in a study conducted in 2023, and QoL was found to be lower in those with low PA level [9]. Additionally, a study investigating reasons for non-compliance with exercise in individuals with obesity revealed that compliance was quite low [10].

Although there are some studies in the literature examining the effects of obesity and weight loss on QoL, to our knowledge, there are no studies examining exercise compliance and the effect of compliance on QoL in people with obesity followed in a multidisciplinary unit [11, 12]. This study, aimed to examine changes in QoL and PA levels, factors influencing exercise compliance, and factors affecting the change in QoL with a 12-week multidisciplinary obesity program.

## Material and Methods

Patients who applied to our Multidisciplinary Obesity Unit between January 2022 and January 2023 and who had the following characteristics were included in our study:

-18-65 years old,

-BMI ≥30,

-Adherence to a prescribed calorie-restricted diet

The exclusion criteria were:

-Those with serious musculoskeletal diseases that prevent them from exercising,

-Pregnancy,

-Those who have undergone bariatric surgery

Demographic data of the participants were recorded.

The PA level of all patients was assessed with the International PA Questionnaire-Short Form (IPAQ-SF). The IPAQ-SF includes questions that provide information on time spent on various activities. The total score is calculated by summing the duration and frequency of walking, moderate activity and vigorous activity. Accordingly, there are 3 activity levels: 1. inactive, minimally active, and very active [13].

The Impact of Weight on QoL-Lite (IWOQL-Lite) scale was used to assess QoL. The IWQOL-Lite scale consists of 31 items covering bodily functions, self-confidence, social pressure, sexual life and work subgroups [14]. Each item has a Likert scale. The number of items to be completed for each subgroup to calculate the scale score is as follows: At least 6 out of 11 items for bodily functions, at least 4 out of 7 items for self-confidence, at least 2 out of 4 items for sexual life, at least 3 out of 5 items for social pressure, and at least 2 out of 4 items for work. The subgroup and total scores of the IWQOL-Lite scale are calculated with a formula developed specifically for the scale, and the score that can be obtained from the scale can vary between 0 and 100, and the higher the score, the higher the QoL [14].

All participants were evaluated in detail by a minimum of 4 different branches, including general surgeon, endocrinologist, physiatrist and psychiatrist, and appropriate medications were arranged if necessary. If deemed necessary, patients were also consulted to the cardiologist and pulmonologist. Afterward, all people with obesity who applied to the Multidisciplinary Obesity Unit were given the routine diet and psychotherapy, and all these participants were given a 12-week group program consisting of a range of motion, stretching, resistance exercises, aerobic exercises, and were asked to follow the exercise program at least 3 days a week. All individuals were given a follow-up chart for 12 weeks of exercise and a calorie restriction diet. Individuals who complied with the calorie-restricted diet at least 5 days a week for 12 weeks and did not interrupt psychologist interviews were included in the study. Compliance with the exercise program was considered complete if at least 150 minutes of exercise was performed per week [15, 16]. Participants attended individual and group meetings with a dietitian, psychologist, and physiotherapist for one hour each week throughout the program. At the end of this 12-week program, the IPAQ-SF and IWQOL-Lite scales were administered once again and the individual's compliance with the exercise program was noted.

### *Statistical analysis*

The Statistical Package for the Social Sciences 28.0 for Windows software was used. The variables were analyzed using histograms, probability plots and Kolmogrov-Smirnov tests to determine whether they were normally distributed. When reporting descriptive statistics, data were expressed as mean ± standard deviation (SD), median (minimum-maximum or interquartile range), and frequency and percentage (%). Mann-Whitney U test was used for comparing non-continuous variables or ordinal variables between two groups and the Kruskal Wallis test was used to compare 3 groups. Changes in PA and QoL were calculated using the Wilcoxon test. The relationship between the changes in QoL and age, BMI, degree of obesity and exercise adherence was analyzed by the Spearman correlation test. Factors affecting exercise adherence were analyzed by univariate logistic regression test. A value of $p<0.05$ was used for statistically significance.

### *Ethical Approval*

The study was conducted with people with obesity (BMI>≥30)

who applied to the Multidisciplinary Obesity Unit in our hospital. Before the study, approval was obtained from Dışkapı Yıldırım Beyazıt Education and Research Hospital`s Local Ethics Committee (Date: 2021-12-27, No: 127/18). The study was carried out in accordance with the Declaration of Helsinki. A detailed informed consent form was obtained from all patients.

## Results

The study included 80 patients who agreed to participate and met the criteria. 15 patients dropped out of the program for various reasons and 65 patients completed it. The mean age was 40.07 ± 12.04 years. 55 of the participants were women and 10 were men. The mean BMI was 42.51 ± 6.98. Fourty-nine (75.4%) individuals were actively working. Four (6.2%) were obese (BMI=30-34.9), 12 (18.5%) were super obese (BMI=35-39.9) and 49 (75.4%) were morbidly obese (BMI≥40). While 32 (49.2%) patients had no comorbidity, 33 (50.8%) had at least one comorbidity (cardiac, endocrine or pulmonary).

Figure 1 shows the change in PA levels among the participants and this change is statistically significant (p<0.05). At the end of the program, significant improvement was observed in QoL, including all sub-parameters, compared to baseline (p<0.05, Figure 2).

There was no difference between men and women, between with comorbidity and without comorbidity, and between active workers and non-active workers, and change in the QoL (p=0.227, p=0.807, p=0.417, respectively) (Table 1). There was a negative correlation was determined between age and change in the QoL (r=-0.330, p=0.007), and a positive correlation was determined between exercise compliance and change in the QoL (r=0.545, p<0.001). No correlation was found between BMI, obesity severity, and change in the QoL (r=-0.144, p=0.251; r=-0.087, p=0.491, respectively) (Table 2).

Factors affecting exercise compliance are examined in Table 3, and none of the parameters such as gender, age, marital status, active working status, BMI, obesity severity, and accompanying diseases were found to be independent risk factor of exercise compliance (p>0.05).

**Table 1.** Factors Associated with Change in Quality of Life-1

| | | Median (IQR) | p |
|---|---|---|---|
| Gender | Woman | 6.45 (22.58) | 0.227* |
| | Man | 0 (8.27) | |
| With comorbidity | Yes | 7.26 (20.97) | 0.807* |
| | No | 4.63 (19.15) | |
| Actively working status | Yes | 6.45 (11.90) | 0.417* |
| | No | 6.45 (22.99) | |

IQR: interquartile range
*:Mann*: Mann Whitney U test, **: Kruskal Wallis test
p<0.05 values were accepted as statistically significant

**Table 2** Factors Associated with Change in Quality of Life-2

| | Change in Quality of Life | |
|---|---|---|
| | r | p |
| Age | -0.330 | 0.007 |
| BMI | -0.144 | 0.251 |
| Obesity severity | -0.087 | 0.491 |
| Exercise compliance | 0.545 | <0.001 |

BMI: body mass index
*Spearman correlation test

**Table 3.** Factors Affecting Adherence to Exercise (Univariate Regression Analysis)

| | Odds Ratio | 95 % CI | p |
|---|---|---|---|
| Age | 0.953 | 0.91/1.01 | 0.067 |
| Gender (Man) | 1.385 | 0.31/6.14 | 0.668 |
| Marital status (Married) | 0.760 | 0.33/1.76 | 0.521 |
| Actively working status (Active worker) | 0.637 | 0.18/2.22 | 0.480 |
| BMI | 0.997 | 0.92/1.08 | 0.944 |
| Obesity severity (Morbid obese) | 0.981 | 0.37/2.58 | 0.970 |
| Comorbidity (with comorbidity) | 0.688 | 0.22/ 2.15 | 0.525 |

## Discussion

In recent years, changes in lifestyle, diet, and sedentary lifestyle have increased the prevalence of obesity at an alarming rate all over the world, including Turkey [17].

In this study examining the effectiveness of a Multidisciplinary Obesity Unit, improvement was noted in the QoL and PA levels of people with obesity. It was determined that the change in the QoL of the patients was less in older participants, and this change was greater in those with good exercise compliance. Age, male gender, being married, being actively working, severity of obesity, BMI, and having additional comorbidities were not found to be effective on exercise compliance.

In a study in which people with obesity were followed up for

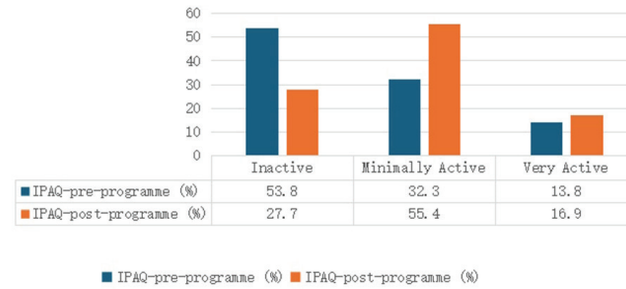


**Figure 1.** Change in Physical Activity Level of Patients
IPAQ: International Physical Activity Questionnaire (Short Form)
Wilcoxon test, the value considered statistically significant is p<0.05

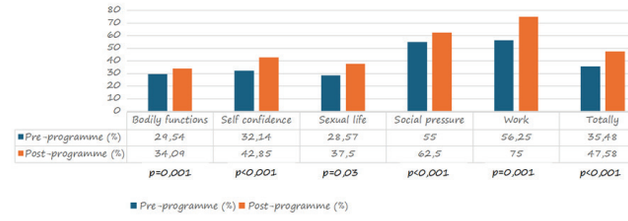


**Figure 2.** Changes in Patients' Quality of Life
The Impact of Weight on Quality of Life was evaluated in six parameters.
Wilcoxon test, p<0.05 values were accepted as statistically significant

6 months after a 6-month exercise treatment program, no difference was found in PA after 6 months of exercise program compared to baseline, but a significant difference was found at the end of 12 months of follow-up compared to baseline [18]. We also found a significant difference in the PA levels of our patients at the end of 12 weeks compared to baseline. However, due to the study design, the long-term results of the change in PA were not examined.

In the study in which 926 people with obesity were evaluated after a 1-year weight loss process, the change in IWQOL-Lite was found to be statistically significant [19]. In this study, where we examined the effects of exercise and diet on QoL, regardless of the amount of weight loss, we found that there was a significant change in QoL despite a relatively short 12-week program.

Obesity is an important factor that reduces the QoL of individuals. Such negative effects of obesity are more pronounced in older ages [20]. In our study, the change in QoL with 12-week exercise program decreased with advancing age. Lifestyle modification recommendations, such as regular physical exercise and balanced diets are the cornerstone in of all lifestyle-related diseases. Dubasi S et al. showed that only 15% of people with obesity achieved the 10% body weight reduction goal, and this low rate is attributed to non-adherence to lifestyle change recommendations [21]. Low exercise compliance rates have been reported not only in obesity but also in most chronic diseases and conditions [22]. Understanding the determinants of non-adherence to lifestyle change recommendations can help physicians plan and implement focused interventions to help these patients achieve long-term and sustainable weight loss.

In a systematic review on barriers to behavior change in obesity, the reasons for non-compliance were summarized as social pressure, lack of motivation, health and physical limitations, lack of awareness, lack of time, socioeconomic constraints, negative thoughts, and finding exercise boring [23]. In the same study, it was stated that those who were able to lose weight earlier, those who had a lower initial BMI, a better mood, men, and those who were older were more likely to comply with the programs [23]. In contrast, no statistically significant relationship was found between age, gender, BMI and exercise compliance in our study. Differences in the number of participants and study design may be effective in obtaining different results. In our study, unlike others; motivation-related parameters such as individuals' social environment and beliefs were not examined. Although motivational interviews were conducted in the Multidisciplinary Obesity Unit with a dietitian and a psychologist, notes regarding these interviews were not included in our study.

In recent years, there has been a move away from the "one-size-fits-all" approach to obesity treatment. Attention has been focused on the effects of sex hormones, the menstrual cycle, pregnancy, and menopause on energy expenditure. The influence of sex differences is increasingly emphasized in diet and weight loss research. Although general PA recommendations in the fight against obesity do not differentiate between genders, there may be gender differences in response to voluntary physical activity [24]. In our study, the level of compliance with the given program was examined, not the amount of energy consumption or weight loss, and no statistically significant difference was obtained in the level of compliance with the exercise program between both genders. This result obtained in our study may require further research due to the small number of patients included in this study and the fact that the number of women in the study was considerably higher than that of men. The literature includes measures of adherence such as a dietary assessment questionnaire, periodic three-day food records, records of daily amount of exercise, patient-reported rates of adherence to treatment protocol, and rates of attendance at intervention sessions [25]. In this study, we used the individual's own exercise compliance tracking chart and evaluated participants' compliance with the program, regardless of whether they were able to lose weight. In addition to differences in study designs, variations in evaluation parameters may also be the reason for different results.

### *Limitation*

This study has a few limitations. First, since it is a single-center study, the number of patients is limited. In addition, the assessment of PA level in our study was done with a 3-stage scale and this scale may not be sensitive enough to changes in PA. The short follow-up period of our patients also raises questions about whether and how long these effects will persist in the long term.

### *Conclusion*

Exercise compliance rate is low in people with obesity. By following a certain exercise and diet program, even for a short time, improvement in PA level and QoL can be achieved. Given the wide variation in adherence to treatment components, future studies are needed to demonstrate individualized innovative strategies to improve adherence to exercise programs, and randomized controlled trials examining larger numbers of participants are needed to examine adherence from a variety of perspectives, such as socioeconomic, psychological, and physical.

***Scientific Responsibility Statement***

*The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.*

***Animal and Human Rights Statement***

*All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.*

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***Conflict of Interest***

*The authors declare that there is no conflict of interest.*

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